

REFERENCES

- 1. Wall, J.C. and S.K. Hoekman, <u>Fuel Composition Effects on Heavy-Duty Diesel Particulate Emissions</u>, SAE Paper No. 841364. October 1984.
- 2. Barry et al., <u>Heavy-Duty Diesel Engine/Fuels Combustion</u>
 <u>Performance and Emissions: A Cooperative Research</u>
 <u>Program</u>, SAE Paper No. 852078, October 1985.
- 3. Ingham, M.C., Warden, R.B., <u>Cost-Effectiveness of Diesel</u>
 <u>Fuel Modification for Particulate Control</u>, SAE Paper No. 870556, 1987.
- 4. Rasmussen, E.R., <u>Genotoxicity of Diesel Exhaust Particles</u>
 <u>and Vapors Collected from Engines with and without</u>
 <u>Particulate Trap Oxidizers</u>, Final Report, California Air
 Resources Board Contract No. A5-130-33, June 30, 1988.
- 5. Rondia, D., Cooke, M., and Haroz, R.K., eds., Mobile
 Source Emissions Including Polycyclic Organic Species,
 Dordrecht, Holland: NATO ASI Series, 1982.
- 6. Trijonis, J., <u>Effects of Dieselization and Proposed Air Quality Regulations on Visibility</u>, Air Resources Board Contract No. A2-072-32, 1983.
- 7. McClellan, R.O., Ann. Rev. Pharmacol. Toxicol. 27:279, 1987.
- 8. Albert, R.E., Lewtas, J., Nesnow, S., Thorslund, T.W., and Anderson, E., <u>Risk Anal.</u> 3:101, 1983.
- 9. Albert, R.E., Chen, C., "U.S. EPA Diesel Studies on Inhalation Standards," in <u>Carcinogenic and Mutagenic Effects of Diesel Engine Exhaust</u>, Ishinishi, N., Koizumi, A., McClellan, R.O., and Strober, W., eds., Amsterdam: Eisevier, 1986.
- 10. Mauderly, J.L., Jones, R.K., Griffith, W.C., Henderson, R.F., and McCleilan, R.O., <u>Fundamental and Api. Toxicol.</u> 9:208-, 1987.
- Aviani, P., Technical Support Division, California Air Resources Board, Personnel Communication, March 1988.
- 12. Technical Services Division, <u>California Air Quality Data</u>

 Annuai Summary of 1980 Air Quality Data for <u>Gaseous and Particulate Pollutants</u>, Vol. XII, Sacramento: California Air Resources Board, 1981.

Carey, P., M., <u>Air Toxics Emissions from Motor Vehicles</u>, EPA-AA-TSS-PA- 86-5, September, 1987.



BIBLIOGRAPHY

- Aibert, R.E., Chen, C., <u>U.S. EPA Diesel Studies on Inhalation Hazards</u>, in "Carcinogenic and Mutagenic Effects of Diesel Engine Exhaust", Ishinishi, N., et al., eds., Eisevier, pp. 411-420, 1986.
- Albert, R.E., Lewtas, J., Nesnow, S., Thorslund, T.W., and Anderson, E., <u>Comparative Potency Method</u> <u>for Cancer Risk Assessment</u>, Risk Anal., 3:101, 1983.
- Andrews, G.E., Iheozor-Ejiofor, I.E., and Pang, S.W., <u>Diesel Particulate SOF Emissions Reduction</u>
 <u>Using an Exhaust Catalyst</u>, SAE Paper No. 870251.
- Barry, E.G., Hills, F.J., and McCabe, L.J., <u>Diesel</u> <u>Fuel Availability. Trends. and Performance</u>, SAE Paper No. 790921, 1979.
- Barry et al., <u>Heavy-Duty Diesel Engine/Fuels</u>
 <u>Combustion Performance and Emissions: A</u>
 <u>Cooperative Research Program</u>, SAE Paper No.852078,
 October 1985.
- Bauer, M.A., Utel, M.J., Morrow, P.E., Speers, D.M., and Gibb, F.R., <u>0.30 ppm Nitrogen Dioxide</u> <u>Inhalation Potentiates Exercise-Induced</u>
 <u>Bronchospasm in Asthmatics</u>, Amer. Rev. Respir. Dis., 129:a151, 1984.
- Billon, A., et. al, <u>More Ways to Use Hydrocracking</u>, Hydrocarbon Processing, May 1978, pp. 122-128.
- Bouffard, R.A., and Beltzer, M., <u>Light Duty Diesel</u>
 Particulate Emissions Fuel and Vehicle Effects,
 SAE Paper No. 811191, 1981.
- Bowden, J.N., Brinkman, D.W., <u>Stability of</u>
 <u>Alternate Fuels</u>, Hydrocarbon Processing, pp. 77-81,
 July 1980.
- Briggs, T., Throgmorton, J., and Koraft, M., Air Quality Assessment of Particulate Emissions from Diesel-Powered Vehicles, EPA-450/3-78-038, March 1978.
- Brightwell, J., Fouillet, X., Cassano-Zoppi, A.L., Gatz, R., and Duchosal, F., Neoplastic and Functional Changes in Rodents After Chronic

Inhalation of Engine Exhause Emissions, In "Carcinogenic and Mutagenic Effects of Diesel Engine Exhaust," ishinishi, N., et al., eds., Elsevier, pp. 471-488, 1986

Brurn, L.W., Kaparakos, N.E., Plesko, R.W., and Schoenroth, B.E., <u>Dual Treater/Hydrocarbon on Stream in Canada</u>, Oll and Gas Journal, pp. 90-96, March 26, 1984.

Buell, G.C., <u>Inhalation Carcinogenesis</u>, U.S. Atomic Energy Commission Symp. Ser. 18:209-228, 1970.

Burley, H.A., and Rosebrock, T.L., <u>Automotive</u>

<u>Diesel Engines - Fuel Composition Vs. Particulates</u>,
SAE Paper No. 790923, 1979.

Burley, H.A., Rosebrock, T.L., <u>Automotive Diesel</u> <u>Engines - Fuel Composition vs. Particulates</u>, SAE Paper No. 790923, 1980.

Bykowski, B.B., Hare, C.T., and Baines, T.M., Effects of a Narrow-Cut No. 1 Fuel. and Variation In its Properties. on Light-Duty Diesel Emissions, SAE Paper No. 811193, 1981.

Carey, P., M., Air Toxics Emissions from Motor Vehicles, EPA-AA-TSS-PA, 86-5, U.S. EPA, September, 1987.

Cartellier!, W.P., and Wachter, W.F., Status Report of Strategies to Meet U.S. - 1991 HD Diesel Emission Standards Without Exhaust Gas Aftertreatment, SAE Paper No. 870342, 1987.

Chapman, R.S., Hasselbiad, V., Hayes, C.G., Williams, J.V.R., Hammer, D.I., Air Pollution and Childhood Ventilatory Function. I. Exposure to Particulate Matter in Two Southeastern Cities, 1971-72, "Clinical implications of Air Pollution Research, Finkel, A.J., and Duel, W.C., eds., Publishing Science Group, Inc., Acton MA, pp. 285-303, 1976.

Chevron Research Company, <u>Fuel Composition Effects</u> on <u>Diesel Particulate Emissions</u>, Presentation to the Air Resources Board staff June 6, 1984 (available for inspection at ARB headquarters, 1102 "Q" Street, Sacramento, California).

Chevron Research Company, <u>Fuel Composition Effects</u>
on Diesel Particulate <u>Emission</u>, presentation by

- Chevron Research to the South Coast Air Quality Management District, July 17, 1984.
- Cohen, A.A., Bromberg, S., Buechler, R.W., Heldereschelt, L.T., Shy, C.M., <u>Asthma and Air</u> <u>Pollution from a Coal Fueled Power Plant</u>, Am. J. Pub. Health, 62:1181-, 1972.
- Collins, J.M., Inzelman, G.H., <u>Diesel Trends Put</u>
 New Emphasis on Economics and Fuel Quality, Oll and Gas Journal, pp. 87-94, May 31, 1982.
- Collins, J.M., Unzelman, G.H., <u>Alternatives</u>
 <u>Available to Meet Diesel Cetane Quality Challenge</u>,
 Oll and Gas Journal, pp. 71-77, May 30, 1983.
- Colome, S., (March 1988) Interim Report, California Air Resources Board, Contract No. A4-111-32, 1988.
- Detels., R., Rokaw, S.N., Coulson, A.H., Tashkin, D.P., Sayre, J.W., Massey, F.J., Jr., <u>The UCLA Population Studies of Chronic Obstruction</u>

 Respiratory Disease. Methodology and Comparison of Lung Function in Areas of High and Low Pollution, Am. J. Epid., 109:33-58, 1979.
- Dietzmann, H.E., Lou, T.P., <u>Emissions</u> <u>Characterization of Diesel Forklift Engines</u>, SAE Paper No. 841396, 1984.
- Of Pollutant Formation Within the Combustion Space of a Diesel Engine, SAE Paper No. 780277, 1978.
- Ferris, B.G., Jr., and Anderson, D.O., <u>The Prevalence of Chronic Respiratory Disease in a New Hampshire Town</u>, Am. Rev. Respir. Dis. 86:165-177, 1962
- Ferris, B.G., Jr., Chen, H., Puleo, S., Murphy, R.L.H., Jr., Chronic On-Specific Respiratory

 Disease in Berlin. New Hampshire. 1967-1973, Am. Rev. Respir. Dis., 113:465-486, 1976.
- Ferris, B.G., Jr., Higgins, I.T.T., Higgins M.W., Peters, J.W., Van Guase, W.F., Goldman, M.D., Chronic Non-specific Respiratory Disease. Berlin. New Hampshire. 1961-67: A Cross Section Study, Am. Rev. Respir. Dis. 104:232-244, 1971.
- Florey, C., Melia, R.J.W., Chinn, S., Goldstein, B.D., Brooks, A.G.F., Johns, H.H., Craighead,

- I.B., and Webster, X., <u>The Relation Between</u>
 Respiratory liliness in Primary School Children and the Use of Gas for Cooking. III Nitrogen Dioxide.
 Respiratory liliness and Lung Infection, Int. J. Epid., 8:347, 1979.
- Frisch, L.E., Johnson, J.H., and Leddy, P.G., Effect of Fueis and Dilution Ratio on Diesel Particulate Emissions, SAE Paper No. 790417, 1980.
- Fujimaki, H., Shimiyu, F., Kubota, K., Effect of Subacute Exposure to NO2 on Lymphocytes Required for Antibody Responses, Environ. Research, 29:280-286,1982.
- Garshick, E., Schenker, M.B., Munoz, A., Segal, M., Smith, T.J., Woskie, S.R., Hammond, S.K., and Speizer, F.E., <u>A Retrospective Cohort Study of Lung Cancer and Diesel Exhaust Exposure in Railroad Workers</u>, Am. Rev. Respir. Dis., in Press, 1988.
- Garshick, E., Schenker, M.B., Munoz, A., Segal, M., Smith, T.J., Woskie, S.R., Hammond, S.K., and Spelzer, F.E., <u>A Case-control Study of Lung Cancer and Diesel Exhaust Exposure in Rallroad Workers</u>, Am. Rev. Respir. Dis. 135:1242, 1987.
- Gearhart, J.M., Schlesinger, R.B., <u>A Morphometric</u>
 <u>Analysis of Rabbit Alrways After Repeated Exposures</u>
 <u>to Sulfuric Acid Aerosol</u>, Toxicologist, 7:193,
 1987.
- Gill, A.P., <u>Design Choices For 1990's Low Emission</u> <u>Diesei Engines</u>, SAE Paper No. 880350, 1988.
- Glassman, I., $\underline{\text{Combustion}}$, Academic Press, New York, 1977.
- Gross, G.P., and Murphy ,K.E., Jr, <u>The Effects of Diesel Fuel Properties on Performance. Smoke. and Emissions</u>, Transactions of the ASME, Paper No. 78-DGP-26.
- Hammer, D.I., Respiratory Disease in Children Exposed to Sulfur Oxides and Particulates, EPA-600/1-77-043, U.S. Environmental Protection Agency, Research Triangle Park, N.C., 1977.
- Hare, C.T., Methodology for Determining Fuel Effects on Diesel Particulate Emissions, EPA-650/2-75-056, March 1975.

- Harris, J.E., <u>Potential Risk Of Lung Cancer from Diesel Engine Emissions</u>, National Academy Press, 1981.
- Heirigs, P.,L., and Susnowitz, R., Motor Vehicle Control Measures for Inclusion in The South Coast Air Quality Management District's Planning and Modeling Efforts, Sacramento, CA: California Air Resources Board, May, 1988.
- Hodgkin, J.E., Abbey, D.E., Enleu, G.L., Magle, A.R., COPD Prevalence in Nonsmokers in High and Low Photochemical Air Pollution Areas, Chest, 86:830-838, 1984.
- Horie, Y., and Rapoprt, R., "Assesment of Heavy-Duty Gasoline and Diesel Vehicles in California: Population and Use Patterns," Final Report, California Air Resources Board Contract No. A2-155-32, July 1985.
- IMechE, <u>Petroleum Based Fuels and Automotive</u>
 <u>Applications</u>, Mechanical Engineering Publications
 Limited, London, 1986.
- ingalls, M.N., Springer, K.J., <u>Measurement of Sulfate and Sulfur Dioxide in Automotive Exhaust</u>, EPA 46613-76-015, June 1976.
- ingham, M.C., Warden, R.B., <u>Cost-Effectiveness of Diesel Fuel Modification for Particulate Control</u>, SAE Paper No.870556, 1987.
- Iqbai, Z.M., Dahl, D., Epstein, S.S., Role of Nitrogen Dioxide in the Biosynthesis of Nitrosamines in Mice, Science, 207:1475-1477, 1980.
- Ishinishi, N., Koizumi, A., McClellan, R.O., and Stober, W., eds. <u>Carcinogenic and Mutagenic Effects of Diesel Engine Exhaust</u>, Elsevier, Amsterdam, 1986.
- Ishinishi, N., Kuwabara, N., Nagase, S., Suzuki, T., Ishiwata, S., and Kohmo, T., Long-term Inhalation Studies on Effects of Exhaust from Heavy and Light Duty Diesel Engines on F344 SPF Rats, in "Carcinogenic and Mutagenic Effects of Diesel Engine Exhaust", Ishinishi, N., et al., eds., Elsevier, pp. 329-348, 1986.
- iwal, K., Udagawa, T., Yamagishi, M., and Yamada, H., Long-term inhalation Studies of Diesel Exhaust

- on F344 SPF Rats, in "Carcinogenic and Mutagenic Effects of Diesel Engine Exhaust", Ishinishi, N., et al., eds., Elsevier, pp. 349-360, 1986.
- Johnson, A.D., <u>Study Shows Marginal Cetane Gains</u>
 <u>From Hydrotreating</u>, Oil and Gas Journal, pp 78-82, May 30, 1983.
- Kagawa, J., and Toyama, T., <u>Photochemical Air</u>
 <u>Pollution: Its Effects on Respiratory Function of Elementary School Children</u>, Arch. Environ. Health, 30:117-122, 1975.
- Kane, D.D., and Iwamoto, R.Y., <u>A Nove! Approach to the Control of Heavy-Duty Diese! Particulate Emissions</u>, SAE Paper No. 880634, 1988.
- Killen, P.J., <u>LP Model Simulation Show How Crude</u>. <u>Product Trends Will Shape U.S. Refining</u>, Oli and Gas Journal, pp. 83-92, May 30, 1983.
- Koenig, J.Q., Morgan, M.S., Horike, M., Pierson, W.E., <u>The Effects of Sulfur Oxides on Nasal and Lung Function in Adolescent Asthmatics with Extrinsic Asthma</u>, J. Allergy Clin. immunol., 76:813:818, 1985.
- Knuth H.W., and Garthe, H., <u>"Future" Diesel Fuel Compositions Their Influence on Particulates</u>, SAE Paper No. 88273, 1988.
- Kuraitis, K.V., Richters, A., and Sherwin, R.P., Spleen Changes in Animals Inhaling Ambient Levels of Nitrogen Dioxide, J.Toxicol. Environ. Health, 7:851-859, 1981.
- La Pera, M.E., <u>Fuel Quality vs. Engine Type</u>, Hydrocarbon Processing, pp. 139-142, Tanway, 1982.
- Last, J.A., Reiser, K.M., Tyler, W.S., Rucker, R.B., Long-term Consequences of Exposure to Ozone.

 L. Lung Collagen Content, Toxicol. Appl.

 Pharmcol., 72:111-118, 1984.
- Lawther, P.J., Waller, R.E., and Henderson, M., <u>Air Pollution and Exacerbations of Bronchitis</u>, Thorax, 25:525-539, 1980.
- Lenner, M., Lindqvist, O., Ljungstrom, E., Lundgren, I., and Rosen, A., Society of Automotive Engineers, Technical Paper Series, No. 821037, 1982.

- Lepperhoff, G., Kroon, G., <u>Impact of Particulate</u>

 <u>Traps on the Hydrocarbon Fraction of Diesel</u>

 <u>Particles</u>, SAE Paper No. 850013.
- Lilly, L. C. R., <u>Diesel Engine Reference Book</u>. Butterworth and Co., Ltd., 1984.
- Lin, C.S., and Foster, E.D., <u>A Study of Fuel</u>
 <u>Nitrogen Conversion. Performance. and Emission</u>
 <u>Characteristics of Biended SCR-11 in a High-Speed</u>
 <u>Diesel Engine</u>, SAE Paper No. 810251, 1981.
- Lunn, J.E., Knowelden, J., and Handside, A.J., Patterns of Respiratory lliness in Sheffleid Infant School Children, Br. J. Prev. Soc. Med., 21:7-16, 1967.
- Lunn, J.E., Knowelden, J., and Roe, J.W., <u>Patterns of Respiratory illness in Sheffield Junior School Children</u>. A Follow-up Study, Br. J. Prev. Soc. Med., 24:223-228, 1970.
- Marshall, W.F., Clark, C.R., and McClellan, R.O. Diesel Particulates and Bloassay Effects of Fuels, Vehicles. and Ambient Temperature, SAE Paper No. 820813, 1982.
- Martin, A.E., <u>Mortailty and Morbidity Statistics</u> and <u>Air Pollution</u>, Proc. R. Soc. Med., 57:969-975, 1964.
- Martin, A.E., and Bradley, W.H., Mortality. Fog and Atmospheric Pollution -- An Investigation During the Winter of 1958-59, Mon. Bull. Minist. Health, Public Health Lab. Serv. 19:65-72, 1960.
- Matarrese, G., et al., <u>Process Conditions are</u> <u>Important in Dearomatizing Gas Oil</u>, Oli and Gas Journal, June 13, 1983, pp. 111-114.
- Mauderly, J.L., Jones, R.K., Griffith, W.C., Henderson, R.F., and McClellan, R.O., <u>Diesel</u> <u>Exhaust in a Pulmonary Carcinogen in Rats Exposed</u> <u>Chronically by Inhalation</u>, Fundamental and Apil. Toxicol. 9:208-, 1987.
- Mautz, W., McClure, T., Reischl, P., Phalen, R., Crocker, T., Enhancement of Ozone-Induced Lung Injury by Exercise, J. Toxicol. Envir. Health, 16:841-854, 1985.

- Mazumdar, S., Schimmel, H., and Higgins, I., <u>Daily Mortality. Smoke. and SO2 in London. England. 1959-1972</u>, Proceedings of APCA Conference on the Proposed SO₂ and Particulate Standard, pp. 219-239, 1981.
- McClellan, R.O., <u>Health Effects of Exposure to Diesel Exhaust Particles</u>, Ann. Rev. Pharmacol. Toxicol. 27:279, 1987.
- McCulloch, D.C., <u>Feed Hydrotreating Improves FCCU Performance</u>, Oll and Gas Journal, July 21, 1975, pp. 53-58.
- McClellan, R.O., <u>Health Effects of Diesel Exhausts:</u>

 <u>A Case Study in Risk Assessment</u>, AM. Ind. Hyg.

 Assoc. J., 47:1, pp. 1-13, 1986.
- McDonnell, W.F., Chapman, R.S., Leigh, M.W., Strope, G.L., Collier, <u>Respiratory Responses of Vigorously Exercising Children to 0.12ppm Ozone Exposure</u>, Am. Rev. Respir. Dis., 132:875-879, 1985.
- McDonnell, W.F., Horstman, D.H., Hazucha, M.J., Seal, E., Jr., Haak, E.D., Salaam., S., House., D.E., Pulmonary Effects of Ozone Exposure During Exercise: Dose-Response Characteristics, J. Appl. Physiol.: Respir. Environ. Exercise Physiol., 54:1345-1352, 1983.
- Mersch, J., Dyce, B.J., Haverback, B.J., Sherwin, R.P., <u>Diphosphoglycerate Content of Red Blood</u>
 <u>Cells. Measurements in B4 Guinea Pigs Exposed to O.4ppm Nitrogen Dioxide</u>, Arch Environ. Health, 27,94-95, 1973.
- Miller, F. J., J. A. Graham, J.W. !!ling, D.E. Gardner, Extrapulmonary Effects of NO2 as Reflected by Pentobarbitai-Induced Sleeping Time in Mice, Tox. Lett., 6:267-274, 1980.
- Mobil Research and Development Corporation, <u>MOGD</u>
 <u>Publications</u>, Collection of Publications Concerning
 the Mobil-Olefin-to-Gasoline-and-Distillate (MOGD)
 Process, August 1986.
- Mobile Source Division, <u>Motor Vehicle Emissions</u>
 <u>Standards Summary</u>, El Monte, CA: California Air
 Resources Board, January, 1988.
- Mobil Source Division, <u>Estimate of the Impact of Various Diesei Particulate Control Strategies on</u>

- Research Division, <u>Staff Report on California</u>

 <u>Ambient Air Quality Standard for Particulate Matter (PM-10)</u>, Sacramento, CA: California Air Resources

 Board, 1982.
- Richards, R.R., and Sibley, J.E., <u>Diesel Engine</u>
 <u>Emissions Control for the 1990's</u>, SAE Paper No. 880346, 1988.
- Richters, A., Kuraitis, K., <u>Inhalation of NO2 and Blood-Borne Cancer Cell Spread to the Lungs</u>, Arch Environ. Health, 36:36-39, 1981.
- Romdia, D., Cooke, M., and Haroz, R.K., eds. <u>Mobile</u>
 <u>Source Emissions Including Polycyclic Organic</u>
 <u>Species</u>. NATO ASI Series Dordrecht, Holland, 1982.
- Russel, A.G., "A Quantitative Estimate of the Air Quality Effects of Methanol Fuel Use", Interim Report, California Air Resources Board Contract No. A6-048-32, April 1988.
- Ryan, T.W., Starment, J.O., and Wright, B.R., <u>The Effects of Fuel Properties and Composition on Diesel Engine Exhaust Emission A Review</u>. SAE Paper No. 810953, 1981.
- SAE/SP-86/675, <u>Diesel Fuels: Performance and Characteristics</u>, international Fuels and Lubrications Meeting and Exposition, October 6-9, 1986.
- SAE/SP-85/639, <u>Diesei Fuel Quality and Trends</u>, international Fuels and Lubrications Meeting and Exposition, October 21-24, 1985.
- SAE/SP-86/659, New Diesel Engines: The Next Generation, Internation Congress and Exposition, February 24-28, 1986.
- SAE/P-84/140, <u>Diesel Particulate Traps</u>, International Congress and Exposition, February 27 - March 2, 1984.
- Samet, J.M., Bishop, Y., Speizer, F.E., Spengler, J.D., Ferris Jr., B.G., <u>The Relationship Between</u>
 <u>Air Pollution and Emergency Room Visits in an Industrial Community</u>, JAPCA 31:236-240, 1981.
- Saric, M., Fugas, M., and Hrustic, O., <u>Effects of Urban Air Pollution</u>, Arch. of Environ. Health, 36:101-108, 1981.

Emissions of Toxic Compounds, El Monte, CA: California Air Resources Board, May 1987.

Mostardi, R.A., and Leonard, D., <u>Air Pollution and Cardiopulmonary Functions</u>, Arch. Environ. Health 29:325-328, 1974.

Mostardi, R.A., and Marteli, R., <u>The Effects of Air Pollution on Pulmonary Functions in Adolescents</u>, The Ohio J. of Science, 75:65-69, 1975.

Murcla, A.A., Sondek, N., Quinn, G.P., and D'Souza, Add Flexibility to FCC's, Hydrocarbon Processing, September 1979, pp. 131-142.

National Research Council, <u>Diesel Technology – Impacts of Diesel-Powered Light-Duty Vehicles</u>, Report of the Technology Panel of the Diesel impacts Study Committee, National Academy Press, Washington, D.C., 1982.

NPRA Q&A - 3, <u>Hydrocprocessing Catalyst Play Vital</u> Quality Role, Oli & Gas Journal, May 5, 1986, PP. 155 - 162.

Office of Mobile Sources, Office of Air and Radiation, Air Quality Benefits of Alternative Fuels, U.S. Environmental Protection Agency, July, 1987.

Power industries Division of The institute of Mechanical Engineers and the Japanese Society of Mechanical Engineers, <u>Combustion Engines: reduction of friction and wear</u>, Papers read at the Institute of Mechanical Engineers at the conference hels by The Institute of Mechanical Engineers at London on March 18-119, 1985.

Program Planning Section, <u>Control Strategies for Heavy-Duty Diesel Particulate Emissions</u>, Sacramento, CA: Cailfornia Air Resources Board, July, 1987.

Rasmussen, E.R., Geuotoxicity of Diesel Exhaust Particles and Vapors Collected from Engines With and Without Particulate Trap Oxidizers, Final Report, Contract No. a5-130-33, California Air Resources Board, June 30, 1988.

Rennard, R.J., and Swift, H.E., <u>Hydrogenation of Distillate Feedstocks</u>, Chemical Engineering Progress, pp. 69-72, December 1981.

Saywer, R.F., and Pitz, W.,J., "Assessment of the impact of Light-Duty Diesel Vehicles on Solling in California", Final Report, California Air Resources Board Contract No. A2-064-32, January, 1983.

Schlesinger, R.B., Naumann, B.D., Chen, L.C., Physiological and Histological Alterations in the Bronchial Mucociliary Clearance System of Rabbits Following Intermittent Oral or Nasal Inhalation of Sulfuric Acid Mist, J. Toxicol. Environ. Health, 12:441-465.

Schrepfer, M.W., Arnold R.J., and Stansky, C.A., Distillate Stability Ensured by Testing Treatment, Oll and Gas Journal, pp. 79-84, January 16, 1984.

Schreck, R.M., McGrath, J.J., Swarin, S.J., Hering, W.E., Grobilcki, P.J., and MacDonald, J.C., Characterization of Diesel Exhaust Particulate Under Different Engine Load Conditions, 78-33.5, Meeting of the Air Pollution Control Association, June 25-30, 1978.

Schrepfer, M.W., Arnold, R.J., and Stansky, C.A., Distillate Stability Ensured by Testing, Treatment, Oli and Gas Journal, June 16, 1984, pp. 79-84.

Seizinger D.E., et. al, <u>Diesel Particulates and Bloassay Effect of Fueis</u>. <u>Vehicles</u>, and <u>Amblent Temperature</u>., SAE Paper No. 820813, 1982.

Selzinger D.E., Marshall W.F., and Brooks, A.L., Fuel influences on Diesel Particulates, SAE Paper No. 850540, 1985.

Seizinger, D.E., Noeknan, S.K., <u>Aromatic</u> <u>Measurement of Diesel Fuel - A CRC Rand-Robin</u> <u>Study</u>, SAE Paper No. 841363, 1984.

Sherwin, R.P., and Layfield, L.J., <u>Proteinurla in Gulnea Pigs Exposed to 0.5ppm Nitrogen Dioxide</u>, Arch. Environ. Health, 28:336-341,1974.

Sherwin, R.P., and Richters, V., <u>Hyperpiasia of Type 2 Pneumocytes Followin 0.34 ppm Nitrogen Dioxide Exposure: Quantitation by image Analysis</u>, Arch. Environ. Health, 37:306-315, 1982.

Shy, C.M., Hasselblad, V., Burton, R.M., Nelson, C.J., and Cohen, A., <u>Alr Pollution Effects on Ventilatory Function of U.S. Schoolchildren.</u>

Results of Studies in Cincinnati, Chattanooga, and New York, Arch. Environ. Health 27:124-128, 1973.

Smith, G.W., <u>Kinetic Aspects of Diesel Soot</u> Coagulation, SAE Paper No. 820466, 1982.

Smith, L.R., Study of the Effects of Fuel Composition and injection and Cobustion System Type and Adjustment on Ames Bioassay, Nitroaromatics, and PNA Emissions from Light-Duty Diesels.
Southwest Research Institute, San Antonio, August 1985.

Somers, J.H., Garbe, R.J., Lawerence, R.D., and Baines, T.M., <u>Automotive Sulfate Emissions - A Baseline Study</u>, SAE Paper No. 770166, 1977.

Springer, K.J., Stahman, R.C., <u>Unregulated</u>
<u>Emissions from Diesels Used in Trucks and Buses</u>,
SAE Paper No. 770258, 1977.

Springer, K.J., Stahman, R.C., <u>Diesel Car Emissions</u>
<u>— Emphasis on Particulate and Sulfates</u>, SAE Paper
No. 770254, 1977.

Stober, W., Experimental Induction of Tumors in Hamsters. Mice and Rats after Long-term Inhalation of Filtered and Unfiltered Diesel Engine Exhaust, in "Carcinogenic and Mutagenic Effects of Diesel Engine Exhaust", Ishinishi, N., et al., eds., Eisevier, pp. 421-440, 1986.

Takemoto, K., Yoshimura, H., and Katayama, H., Effects of Chronic Inhalation Exposure to Diesel Exhaust on the Development of Lung Tumors in DI-isopropanoi-nitrosamine-treated F344 Rats and Newborn C57BL and ICR Mice, in "Carcinogenic and Mutagenic Effects of Diesel Engine Exhaust", Ishinishi, N., et al., eds., Elsevier, pp. 311-328, 1986.

Technical Support Division," Method Used to Develop a Size-Segregated Particulate Matter Inventory", Sacramento, CA: California Air Resources Board, Draft Report, January, 1988.

Technical Support Division, California Air Quality
Data - Annual Summary of 1980 Air Quality Data for
Gaseous and Particulate Pollutants, Vol. XII,
Sacramento, CA: California Air Resources Board,
1981.

- Technical Support Division, <u>Emissions Inventories</u>
 <u>Based on EMFAC 7C/Burden 7A</u>, Sacramento, CA:
 California Air Resources Board, February, 1988.
- The 1985 California Oli Scenario Study. Bonner and Moore Associates, Inc., March 20, 1980.
- Trajonis, J., "Effect of Diesel Vehicles on Visibility in California", Final Report, California Air Resources Board, Contract No. A2-072-32, October, 1983.
- Tuteja, A.D., and Clark D.W., <u>Comparative</u>

 <u>Performance and Emission Characteristics of</u>

 <u>Petroleum. Oli Shale. and Tar Sands Derived Diesel</u>

 <u>Fuels</u>, SAE Paper No. 800331, 1980.
- Wade, W. R., <u>Effects of Engine Design and Fuels on</u> <u>Diesel Emission Control</u>, 1984.
- Wall, J.C. and Hoekman, S.K., <u>Fuel Composition</u>
 <u>Effects on Heavy-Duty Diesel Particulate Emissions</u>,
 SAE Paper No.841364, October 1984.
- Waller, R., <u>Trends in Lung Cancer in London in</u>
 Relation to Exposure to Diesel Fumes, in "Health
 Effects of of Diesel Engine Emissions", Vol 2.,
 Pepelko, et al., eds., U.S. EPA, pp.1085-1097,
 1980.
- Weaver et al., "Diese! Fuel Quality Effects on Emissions, Durability, and Performance," EPA Contract No.68-01-6543, September 30, 1985.
- White, H., Vostal, J.J., Kaplan, H.L., and MacKenzie, W.F., <u>A Long-term Inhalation Study Evaluates the Pulmonary Effects of Diesel Emissions</u>, J. Appl. Toxicol. 3:332-, 1986.
- Whittemore, A.S., and Korn, E.L., <u>Asthma and Air Pollution in the Los Angeles Area</u>, Am. J. Pub. Health, 70:687-696, 1980.
- Williams, P.T., Andrews, G.E., and Bartle, K.D., Diesel Particulate Emissions: The Role of Unburnt Fuel in the Organic Fraction Composition, SAE Paper No. 870554, 1987.
- Zinger, D.E., Hecker, L.H., <u>Gaseous Emissions from Unregulated Mobil Sources</u>, Journal of the APCA, May 1979, pp. 526-531.

ATTACHMENT B

PROPOSED SECTION 2255 -- SULFUR CONTENT

OF MOTOR VEHICLE DIESEL FUEL

NOTE: The entire text of Section 2255 set forth below is new language proposed to be added to the California Code of Regulations.

.

Section 2255. Sulfur Content of Diesel Fuel

- (a) Regulatory Standard.
- (1) On or after January 1, 1993, no person shall sell, offer for sale, or supply any vehicular diesel fuel which has a sulfur content exceeding 500 parts per million by weight.
- (2) Subsection (a)(1) shall not apply to a transaction where: (I) the person selling, offering for sale, or supplying the diesel fuel demonstrates that s/he has taken reasonable precautions to assure that the diesel fuel will be dispensed to motor vehicles only at altitutes above 3000 feet above sea level and only between November 1 and March 31, and (II) the diesel fuel has a sulfur content not exceeding 1500 parts per million by weight.
- (3) Subsection (a)(1) shall not apply to a sale, offer for sale, or supply of diesel fuel to a refiner where the refiner further processes the diesel fuel at the refiner's refinery prior to any subsequent sale, offer for sale, or supply of the diesel fuel.
- (4) For the purposes of subsection (a)(1), each sale of diesel fuel at retail for use in a motor vehicle, and each supply of diesel fuel into a motor vehicle fuel tank, shall also be deemed a sale or supply by any person who previously sold or supplied such diesel fuel in violation of subsection (a)(1).

(b) Definitions.

For the purposes of this section:

- (1) "Diesel fuel" means any fuel that is commonly or commercially known, sold or represented as diesel fuel No. 1-D or No. 2-D, pursuant to the specifications in ASTM Standard Specification for Diesel Fuel Oils D 975-81.
- (2) "Executive Officer" means the executive officer of the Air Resources Board, or his or her designee.
- (3) "Further process" means to perform any activity on diesel fuel, including distillation, desulfurization, or blending, for the purpose of bringing the diesel fuel into compliance with the standard in subsection (a)(1).
- (4) "Motor vehicle" has the same meaning as defined in Section 415 of the Vehicle Code.
- (5) "Produce" means to convert liquid compounds which are not diesel fuel into diesel fuel.
- (6) "Producer" means any person who produces vehicular diesel fuel in California.
- (7) "Refiner" means any person who owns, leases, operates, controls or supervises a refinery.
- (8) "Refinery" means a facility that produces liquid fuels by distilling petroleum.
- (9) "Supply" means to provide or transfer a product to a physically separate facility, vehicle, or transportation system.
- (10) "Vehicular diesel fuel" means any diesel fuel (A) which is not conspicuously identified as a fuel which may not lawfully

be dispensed into motor vehicle fuel tanks in California; or (B) which the person selling, offering for sale, or supplying the diesel fuel knows will be dispensed into motor vehicle fuel tanks in California; or (C) which the person selling, offering for sale, or supplying the diesel fuel in the exercise of reasonable prudence should know will be dispensed into motor vehicle fuel tanks in California, and that is not the subject of a declaration under penalty of perjury by the purchaser, offeree or recipient stating that s/he will not sell, offer for sale, or transfer the fuel for dispensing, or dispense the fuel, into motor vehicle fuel tanks in California.

(c) <u>Test Method</u>.

The sulfur content of diesel fuel limitation specified in subsection (a)(1) shall be determined by ASTM Test Method D 2622-82, or any other test method determined by the executive officer to give equivalent results.

(d) <u>Presumed Sulfur Content of Diesel Fuel Represented As</u> Being for Nonvehicular Use,

All diesel fuel which has been identified or represented as a fuel which may not be dispensed into motor vehicles in California shall be deemed to have a sulfur content exceeding 500 parts per million by weight, as determined by a test method identified in subsection (c), unless the fuel is tested in accordance with a method identified in subsection (c) and is shown to have a sulfur content of 500 parts per million by weight or less.

- (e) <u>Variances</u>.
- (1) Any person who cannot comply with the requirements set forth in subsection (a)(1) because of extraordinary reasons beyond the person's reasonable control may apply to the executive officer for a variance. The application shall set forth:
 - (A) the specific grounds upon which the variance is sought;
- (B) the proposed date(s) by which compilance with the provisions of subsection (a)(1) will be achieved; and
- (C) a plan reasonably detailing the method by which compliance will be achieved.
- (2) Upon receipt of an application for a variance containing the information required in subsection (e)(1), the executive officer shall hold a hearing to determine whether, or under what conditions and to what extent, a variance from the requirements in established by subsection (a)(1) is necessary and will be permitted. Notice of the time and place of the hearing shall be sent to the applicant by certified mail not less than 20 days prior to the hearing. Notice of the hearing shall also be submitted for publication in the California Administrative Notice Register and sent to every person who requests such notice, not less than 20 days prior to the hearing.
- (3) At least 20 days prior to the hearing, the application for the variance shall be made available to the public for inspection. Interested members of the public shall be allowed a reasonable opportunity to testify at the hearing and their testimony shall be considered.

- (4) No variance shall be granted unless all of the following findings are made:
- (A) that, because of reasons beyond the reasonable control of the applicant, requiring compliance with subsection (a)(1) would result in an extraordinary economic hardship;
- (B) that the public interest in mitigating the extraordinary hardship to the applicant by issuing the variance outweighs the public interest in avoiding any increased emissions of air contaminants which would result from issuing the variance.
- (C) that the compilance plan proposed by the applicant can reasonably be implemented and will achieve compilance as expeditiously as possible.
- (5) Any variance order shall specify a final compliance date by which the requirements in subsection (a)(1) will be achieved. Any variance order shall also contain a condition that specified increments of progress necessary to assure timely compliance be achieved, and such other conditions, including limitations on the sulfur content of diesel fuel produced for use in motor vehicles, that the executive officer, as a result of the testimony received at the hearing, finds necessary to carry out the purposes of Division 26 of the Health and Safety Code.
- (6) The executive officer may require, as a condition of granting a variance, that a cash bond, or a bond executed by two or more good and sufficient sureties or by a corporate surety, be posted by the party to whom the variance was granted to assure performance of any construction, alteration, repair, or other

work required by the terms and conditions of the variance. Such bond may provide that, if the party granted the variance falls to perform such work by the agreed date, the cash bond shall be forfelted to the state board, or the corporate surety or sureties shall have the option of promptly remedying the variance default or paying to the state board an amount, up to the amount specified in the bond, that is necessary to accomplish the work specified as a condition of the variance.

- (7) No variance from the requirements set forth in subsection (a)(1) based on a plan for compliance which includes the installation of major additional equipment shall be issued to a producer where installation of the equipment was not included in a compliance plan and updates submitted pursuant to subsection (f). No such variance shall have a duration of more than three years.
- (8) No variance which is issued due to conditions of breakdown, repair, or maifunction of equipment shall have a duration, including extensions, of more than six months.
- (9) The executive officer may, after holding a hearing without complying with the provisions of subsections (e)(2) and (e)(3), issue an emergency variance to a person from the requirements of subsections (a)(1) upon a showing or reasonably unforeseeable extraordinary hardship and good cause that a variance is necessary. In connection with the issuance of an emergency variance, the executive officer may waive the requirements of subsection (e)(6). No emergency variance may

extend for a period of more than 45 days. If the applicant for an emergency variance does not demonstrate that he or she can comply with the provisions of subsection (a)(1) within such 45—day period, an emergency variance shall not be granted unless the applicant makes a prima facile demonstration that the findings set forth in subsection (e)(4) should be made. The executive officer shall maintain a list of persons who have informed the executive officer in writing of their desire to be notified by telephone in advance of any hearing held pursuant to this paragraph (e)(9), and shall provide advance telephone notice to any such person.

- (10) A variance shall cease to be effective upon fallure of the party to whom the variance was granted substantially to comply with any condition.
- (11) Upon the application of any person, the executive officer may review and for good cause modify or revoke a variance from the requirements of subsection (a)(1) after holding a hearing in accordance with the provisions of subsections (e)(2) and (e)(3).

(f) Submittal of Compliance Plan.

Each producer shall, by January 1, 1990, submit to the executive officer a plan showing the producer's schedule for achieving compliance with subsection (a)(1). Each producer shall, by January 1, 1991 and January 1, 1992, submit an update of the plan.

NOTE: Authority cited: Sections 39600, 39601, 43013, and 43101 of the Health and Safety Code. Reference: Sections 39000, 39001, 39002, 39003, 39500, 39315, 39516, 41511, 43000, 43016, and 43101, Health and Safety Code, and Western Oil and Gas Ass'n, V. Orange County Air Pollution Control District, 14 Cai. 3d 411, 121 Cai. Rptr. 249 (1975).

ATTACHMENT C PROPOSED SECTION 2256 -- AROMATIC HYDROCARBON CONTENT OF MOTOR VEHICLE DIESEL FUEL

ATTACHMENT C PROPOSED SECTION 2256 -- AROMATIC HYDROCARBON CONTENT OF MOTOR VEHICLE DIESEL FUEL

ATTACHMENT C PROPOSED SECTION 2256 -- AROMATIC HYDROCARBON CONTENT OF MOTOR VEHICLE DIESEL FUEL

NOTE: The entire text of Section 2256 set forth below is new language proposed to be added to the California Code of Regulations.

Section 2256. Aromatic Hydrocarbon Content of Diesel Fuel

- (a) Regulatory Standard.
- (1) On or after January 1, 1993, except as otherwise provided in this subsection (a), no person shall sell, offer for sale, or supply any vehicular diesel fuel unless:
- (A) The aromatic hydrocarbon content does not exceed 10 percent by volume; or
- (B) In the case of vehicular diesel fuel that has been reported in accordance with all of the requirements of subsection (d),
- (i) The aromatic hydrocarbon content does not exceed the designated alternative limit, and
- (il) Where the designated alternative limit exceeds 10 percent by volume, the excess aromatic hydrocarbon content is fully offset in accordance with subsection (d); or
- (C) The vehicular diesel fuel is exempt under subsection (e) and the aromatic hydrocarbon content does not exceed 20 percent by volume.
- (2) Subsection (a)(1) shall not apply to the sale, offer for sale, or supply of any diesel fuel blend for which the executive officer has issued a waiver pursuant to subsection (g).
- (3) Subsection (a)(1) shall not apply to a sale, offer for sale, or supply of vehicular diesel fuel to a refiner where the

refiner further processes the diesel fuel at the refiner's refinery prior to any subsequent sale, offer for sale, or supply of the diesel fuel.

(4) For the purposes of subsection (a)(1), each sale of diesel fuel at retail for use in a motor vehicle, and each supply of diesel fuel into a motor vehicle fuel tank, shall also be deemed a sale by any person who previously sold or supplied such diesel fuel in violation of subsection (a)(1).

(b) Definitions.

For the purposes of this section:

- (1) "Criteria pollutant" means any pollutant for which the state board or the U.S. Environmental Protection Agency has established an ambient air quality standard pursuant to Division 26 of the Health and Safety Code or the federal Clean Air Act.
- (2) "Designated alternative limit" means an alternative aromatic hydrocarbon limit, expressed in percent aromatic hydrocarbon content by volume, which is assigned by a producer or importer to a final blend of vehicular diesel fuel pursuant to subsection (d).
- (3) "Diesel fuel" means any fuel that is commonly or commercially known, sold or represented as diesel fuel No. 1-D or No. 2-D, pursuant to the specifications in ASTM Standard Specification for Diesel Fuel Oils D 975-81.
- (4) "Exempt volume" means 55 percent of the average of the highest three year annual production volumes of distillate fuel reported for a small refiner's California refinery in the period

1983 to 1987, inclusive, to the California Energy Commission as required by the Petroleum Industry information Reporting Act of 1980 (Public Resources Code Sections 25350 et seq.).

- (5) "Executive Officer" means the executive officer of the Air Resources Board, or his or her designee.
- (6) "Final blend" means a distinct quantity of diesel fuel which is introduced into commerce in California without further alteration which would tend to affect the fuel's aromatic hydrocarbon content.
- (7) "Further process" means to perform any activity on diesel fuel, including distillation, treating with hydrogen, or blending, for the purpose of bringing the diesel fuel into compliance with the standards in subsection (a)(1).
- (8) "Importer" means any person who first accepts delivery
 In California of vehicular diesel fuel.
- (9) "import facility" means the facility at which imported diesel fuel is first received in California, including, in the case of diesel fuel imported by cargo tank and delivered directly to a facility for dispensing diesel fuel into motor vehicles, the cargo tank in which the diesel fuel is imported.
- (10) "Motor vehicle" has the same meaning as defined in Section 415 of the Vehicle Code.
- (11) "Produce" means to convert liquid compounds which are not diesel fuel into diesel fuel; provided that when a person blends volumes of blendstocks which are not diesel fuel with volumes of diesel fuel acquired from another person, and the

blending has produced the entire volume of the resulting blend and the person who initially converted non-diesel compounds into the acquired diesel fuel has also produced the volume of acquired diesel fuel. When a person blends diesel fuel with other volumes of diesel fuel, without the addition of blendstocks which are not diesel fuel, the person does not produce diesel fuel.

- (12) "Producer" means any person who produces vehicular diesel fuel in California.
- (13) "Refiner" means any person who owns, leases, operates, controls or supervises a refinery.
- (14) "Refinery" means a facility that produces liquid fuels by distilling petroleum. A small refiner's refinery includes all bulk storage and bulk distribution facilities jointly owned or leased with the facility that produces liquid fuels by distilling petroleum.
- (15) "Small refiner" means any refiner who owns or operates a refinery in California that:
- (A) Has and at all times had since January 1, 1978, a crude oil capacity of not more than 50,000 barrels per stream day;
- (B) Has not been at any time since September 1, 1988, owned or controlled by any refiner that at the same time owned or controlled refineries in California with a total combined crude oil capacity of more than 50,000 barrels per stream day; and
- (C) Has not been at any time since September 1, 1988, owned or controlled by any refiner that at the same time owned or

controlled refineries in the United States with a total combined crude oil capacity of more than 137,500 barrels per stream day.

- (16) "Stream day" means 24 consecutive hours of actual operation of a refinery.
- (17) "Supply" means to provide or transfer a product to a physically separate facility, vehicle, or transportation system.
- (18) "Vehicular diesel fuel" means any diesel fuel (A) which is not conspicuously identified as a fuel which may not lawfully be dispensed into motor vehicle fuel tanks in California; or (B) which the person selling, offering for sale, or supplying the diesel fuel knows will be dispensed into motor vehicle fuel tanks in California; or (C) which the person selling, offering for sale, or supplying the diesel fuel in the exercise of reasonable prudence should know will be dispensed into motor vehicle fuel tanks in California, and that is not the subject of a declaration under penalty of perjury by the purchaser, offeree or recipient stating that s/he will not sell, offer for sale, or transfer the fuel for dispensing, or dispense the fuel, into motor vehicle fuel tanks in California.

(c) <u>Test Method</u>.

The aromatic hydrocarbon content limitation specified in subsection (a) shall be determined by ASTM Test Method D 1319-84, or any other test method determined by the executive officer to give equivalent results.

- (d) Designated Alternative Limit.
- (1) A producer or importer may assign a designated alternative limit in accordance with this subsection (d) to a final blend of vehicular diesel fuel produced or imported by the producer or importer. In no case may the designated alternative limit be less than the aromatic hydrocarbon content of the final blend shown by the sample and test conducted pursuant to subsection (f).
- (2) The producer or importer shall notify the executive officer of the volume (in gallons) and the designated alternative limit of the final blend. This notification shall be received by the executive officer before the start of physical transfer of the diesel fuel from the production or import facility, and in no case less than 12 hours before the producer either completes physical transfer or commingles the final blend.
- transfer of any final blend of vehicular diesel fuel to which a producer or importer has assigned a designated alternative limit exceeding 10 percent, the producer or importer shall complete physical transfer from the production or import facility of vehicular diesel fuel in sufficient quantity and with a designated alternative limit sufficiently below the limit specified in subsection (a)(1)(A) to offset the volume of aromatic hydrocarbons in the diesel fuel reported in excess of the limit.

- (4) If, through no intentional or negligent conduct, a producer or importer cannot report within the time period specified in subsection (d)(2), then the producer or importer shall notify the executive officer of the required data as soon as reasonably possible and shall provide a written explanation of the cause of the delay in reporting. If, based on the written explanation and the surrounding circumstances, the executive officer determines that the conditions of this subsection (d)(4) are met, timely notification shall be deemed to have occurred.
- (5) The executive officer may enter into a protocol with any Individual producer or importer for the purposes of specifiying how the requirements in subsections (d)(2) and (3) shall be applied to the producer's or importer's particular operations, as iong as the executive officer reasonably determines that application of the regulatory requirements under the protocol is not significantly less stringent or enforceable than application of the express terms of subsections (d)(2) and (3). The terms of such a protocol shall be limited to one or more of the following: specification of alternative events from which the notification and offset periods are measured, including physical transfer from a production or import facility; provision for flexibility in the deadlines for reporting batches with designated alternative limits to accomodate normal business hours. Any such protocol shall include the producer's or importer's agreement to be bound by the terms of the protocol.

- (6) No person shall sell, offer for sale, or supply vehicular diesel fuel, in a final blend to which a producer or importer has assigned a designated alternative limit exceeding 10 percent aromatics content, where the total volume of the final blend sold, offered for sale, or supplied exceeds the volume reported to the executive officer pursuant to subsection (d)(2) or (5).
- (7) No person shall shall sell, offer for sale or supply vehicular diesel fuel, in a final blend to which a producer or importer has assigned a designate alternative limit less than 10 percent aromatics content, where the total volume of the final blend sold, offered for sale, or supplied is less than the volume reported to the executive officer pursuant to subsection (d)(2) or (5).

(e) Small Refiner Diese! Fuel.

(1) The provisions of subsection (a)(1)(A) and (B) shall not apply to the diesel fuel that is produced by a small refiner at the small refiner's California refinery and that is first consecutively supplied from the refinery in each calendar year for use in motor vehicles, up to the small refiner's exempt volume. This exemption shall not apply to any diesel fuel supplied from a small refiner's refinery in any calendar quarter in which less than 25 percent of the diesel fuel supplied from the refinery was produced from the distillation of crude oil at the refinery.

- (2) To qualify for an exemption under this subsection (e), a refiner shall submit to the executive officer an application for exemption executed in California under penalty of perjury, on a form provided by the executive officer, for each of the small refiner's California refineries. The application shall specify the crude oil capacity of the refinery at all times since January 1, 1978, the crude oil capacities of all the refineries in California and the United States which are owned or controlled by, or under common ownership or control with, the small refiner since September 1, 1988, data demonstrating that the refinery has the capacity to produce liquid fuels by distilling petroleum, and copies of the reports made to the California Energy Commission as required by the Petroleum Industry Reporting Act of 1980 (Public Resources Code Sections 25350 et seq.) showing the annual production volumes of distillate fuel at the small refiner's California refinery for 1983 through 1987. Within 90 days of receipt of the application, the executive officer shall grant or deny the exemption in writing. The exemption shall be granted if the executive officer determines that the applicant has demonstrated that s/he meets the provisions of subsection (b)(15), and shall identify the small refiner's exempt volume. The exemption shall immediately cease to apply at any time the refiner ceases to meet the definition of small refiner in subsection (b)(15).
- (3) In addition to the requirements of subsection (f) below, each small refiner who is covered by an exemption shall submit to

the executive officer reports containing the information set forth below for each of the small refiner's California refinerles. The reports shall be executed in California under penalty of perjury, and must be received within the time indicated below:

- (A) The quantity, ASTM grade, aromatic hydrocarbon content, and batch identification of all diesel fuel, produced by the small refiner, that is supplied from the small refinery in each month for sale for use in motor vehicles, within 15 days after the end of the month;
- (B) For each calendar quarter, a statement whether 25 percent or more of the diese! fuel transferred from the small refiner's refinery that was produced by the distillation of crude oil at the small refiner's refinery, within 15 days after the close of such quarter;
- (C) The date, if any, on which the small refiner completes transfer from its small refinery in a calendar year of the maximum amount of vehicular diesel fuel which is exempt from subsection (a)(1)(A) and (B) pursuant to subsection (e), within 5 days after such date;
- (D) Within 10 days after project completion, any refinery addition or modification which would affect the qualification of the refiner as a small refiner pursuant to subsection (b)(15); and

- (E) Any change of ownership of the small refiner or the small refiner's refinery, within 10 days after such change of ownership.
- (4) Whenever a small refiner falls to provide records identified in subsection(e)(3)(A) or (B) in accordance with the requirements of those subsections, the vehicular diesel fuel supplied by the small refiner from the small refiner's refinery in the time period of the required records shall be presumed to have been sold or supplied by the small refiner in violation of section (a)(1)(A).

(f) <u>Testing and Recordkeeping</u>.

hydrocarbon content each final blend of vehicular diesel fuel which the producer has produced, in accordance with an applicable test method identified in subsection (c). If a producer blends diesel fuel components directly to pipelines, tankships, rallway tankcars or trucks and trailers, the loading(s) shall be sampled and tested for aromatic hydrocarbon content by the producer or authorized contractor. The producer shall maintain, for two years from the date of each sampling, records showing the sample date, product sampled, container or other vessel sampled, final blend volume, and the aromatic hydrocarbon content. In the event a producer sells, offers for sale, or supplies diesel fuel which the producer claims is not vehicular diesel fuel and which has an aromatic hydrocarbon content exceeding the standard set forth in subsection (a)(1), such producer shall maintain, for two years

from the date of any sale or supply of the fuel, records demonstrating that the diesel fuel was not vehicular diesel fuel when it was sold or supplied by the producer. All diesel fuel produced by the producer and not tested as vehicular diesel fuel by the producer pursuant to this subsection shall be deemed to have an aromatic hydrocarbon content exceeding 10 percent, unless the producer demonstrates that the diesel fuel meets the requirements of subsection (a)(1).

- (2) Each importer shall sample and test for aromatic hydrocarbon content each shipment of vehicular diesel fuel which the importer has imported by tankship, pipeline, railway tankcars, trucks and trailers, or other means, in accordance with an applicable test method identified in subsection (c). The importer shall maintain, for two years from the date of each sampling, records showing the sample date, product sampled, container or other vessel sampled, the volume of the shipment, and the aromatic hydrocarbon content. All diesel fuel imported by the importer and not tested as vehicular diesel fuel by the importer pursuant to this subsection shall be deemed to have an aromatic hydrocarbon content exceeding 10 percent, unless the importer demonstrates that the diesel fuel meets the requirements of subsection (a)(1).
- (3) A producer or importer shall provide to the executive officer any records required to be maintained by the producer or importer pursuant to this subsection (d) within 20 days of a written request from the executive officer if the request is

received before expiration of the period during which the records are required to be maintained. Whenever a producer or importer fails to provide records regarding a final blend of vehicular diesel fuel in accordance with the requirements of this subsection, the final blend of diesel fuel shall be presumed to have been sold by the producer in violation of subsection (a)(1).

- (4) The executive officer may perform any sampling and testing deemed necessary to determine compliance by any person with the requirements of subsection (a) and may require that special samples be drawn and tested at any time.
- (5) The executive officer may enter into a protocol with any producer, importer, or person who sells, offers for sale, or transfers diesel fuel to a producer for the purpose of specifying alternative sampling, testing, recordkeeping, or reporting requirements which shall satisfy the provisions of subsections (f)(1), (f)(2), or (e)(3). The executive officer may only enter into such a protocol if s/he reasonably determines that application of the regulatory requirements under the protocol will be consistent with the state board's ability effectively to enforce the provisions of subsection (a). Any such protocol shall include the producer's or importer's agreement to be bound by the terms of the protocol.
 - (g) Walvers for Diesel Fuel Containing Certain Additives.

The executive officer, upon application of any producer or importer, may waive the prohibitions in subsection (a)(1) for a blend of diesel fuel containing an additiva(s) if s/he determines

that the applicant has established that the blend of diesel fuel containing the additive(s), or a specified concentration thereof, results in no greater emissions of any criteria pollutant, precursor to any criteria pollutant, or any substance that has been identified by the state board as a toxic air contaminant, than vehicular diesel fuel having an aromatic hydrocarbon content not exceeding 10 percent.

(h) Variances.

- (1) Any person who cannot comply with the requirements set forth in subsection (a)(1) because of extraordinary reasons beyond the person's reasonable control may apply to the executive officer for a variance. The application shall set forth:
 - (A) the specific grounds upon which the variance is sought;
- (B) the proposed date(s) by which compliance with the provisions of subsection (a)(1) will be achieved; and
- (C) a plan reasonably detailing the method by which compliance will be achieved.
- (2) Upon receipt of an application for a variance containing the information required in subsection (h)(1), the executive officer shall hold a hearing to determine whether, or under what conditions and to what extent, a variance from the requirements in subsection (a)(1) is necessary and will be permitted. Notice of the time and place of the hearing shall be sent to the applicant by certified mall not less than 20 days prior to the hearing. Notice of the hearing shall also be submitted for publication in the California Regulatory Notice Register and sent

to every person who requests such notice, not less than 20 days prior to the hearing.

- (3) At least 20 days prior to the hearing, the application for the variance shall be made available to the public for inspection. Interested members of the public shall be allowed a reasonable opportunity to testify at the hearing and their testimony shall be considered.
- (4) No variance shall be granted unless all of the following findings are made:
- (A) that, because of reasons beyond the reasonable control of the applicant, requiring compliance with subsection (a)(1) would result in an extraordinary economic hardship;
- (B) that the public Interest in mitigating the extraordinary hardship to the applicant by issuing the variance outweighs the public interest in avoiding any increased emissions of air contaminants which would result from issuing the variance.
- (C) that the compilance plan proposed by the applicant can reasonably be implemented and will achieve compliance as expeditiously as possible.
- (5) Any variance order shall specify a final compliance date by which the requirements in subsection (a)(1) will be achieved. Any variance order shall also contain a condition that specified increments of progress necessary to assure timely compliance be achieved, and such other conditions, including limitations on the aromatic hydrocarbon content of diesel fuel produced for use in motor vehicles, that the executive officer, as a result of the

testimony received at the hearing, finds necessary to carry out the purposes of Division 26 of the Health and Safety Code.

- (6) The executive officer may require, as a condition of granting a variance, that a cash bond, or a bond executed by two or more good and sufficient sureties or by a corporate surety, be posted by the party to whom the variance was granted to assure performance of any construction, alteration, repair, or other work required by the terms and conditions of the variance. Such bond may provide that, if the party granted the variance fails to perform such work by the agreed date, the cash bond shall be forfeited to the state board, or the corporate surety or sureties shall have the option of promptly remedying the variance default or paying to the state board an amount, up to the amount specified in the bond, that is necessary to accomplish the work specified as a condition of the variance.
- (7) No variance from the requirements set forth in subsection (a)(1) based on a plan for compliance which includes the installation of major additional equipment shall be issued to a producer where installation of the equipment was not included in a compliance plan and updates submitted pursuant to subsection (i). No such variance shall have a duration of more than three years.
- (8) No variance which is issued due to conditions of breakdown, repair, or maifunction of equipment shall have a duration, including extensions, of more than six months.

- (9) The executive officer may, after holding a hearing without complying with the provisions of subsections (h)(2) and (h)(3), Issue an emergency varianc; to a person from the requirements of subsections (a)(1) upon a showing or reasonably unforeseeable extraordinary hardship and good cause that a variance is necessary. In connection with the issuance of an emergency variance, the executive officer may waive the requirements of subsection (h)(6). No emergency variance may extend for a period of more than 45 days. If the applicant for an emergency variance does not demonstrate that he or she can comply with the provisions of subsection (a)(1) within such 45day period, an emergency variance shall not be granted unless the applicant makes a prima facle demonstration that the findings set forth in subsection (h)(4) should be made. The executive officer shall maintain a list of persons who have informed the executive officer in writing of their desire to be notified by telephone in advance of any hearing held pursuant to this paragraph (g)(9), and shall provide advance telephone notice to any such person.
- (10) A variance shall cease to be effective upon failure of the party to whom the variance was granted substantially to comply with any condition.
- (11) Upon the application of any person, the executive officer may review and for good cause modify or revoke a variance from the requirements of subsection (a)(1) after holding a hearing in accordance with the provisions of subsections (h)(2) and (h)(3).

(1) Submittal of Compliance Plan.

Each producer shall, by January 1, 1990, submit to the executive officer a plan showing the producer's schedule for achieving compliance with subsection (a)(1). Each producer shall, by the beginning of January 1, 1991 and January 1, 1992, submit an update of the plan.

NOTE: Authority cited: Sections 39600, 39601, 43013, and 43101 of the Health and Safety Code. Reference: Sections 39000, 39001, 39002, 39003, 39500, 39315, 39516, 41511, 43000, 43016, and 43101, Health and Safety Code, and Western Oli and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

ATTACHMENT D

PROPOSED AMENDMENTS TO SECTION 2252 -- SULFUR CONTENT

Amendments to Section 2252, Title 13, California Code of Regulations

Amend the title of Section 2252, Title 13, California Code of Regulations, and add a new subsection (o), as follows:

Section 2252. Sulfur Content of Unleaded Gasoline and of Motor

Vehicle Diesel Fuel Sold in the South Coast Air Basin or Ventura

County Before January 1, 1993.

(o) This section shall not apply to diesel fuel sold, offered for sale, or transferred on or after January 1, 1993.

NOTE: Authority cited: Sections 39600, 39601, 43013, and 43101 of the Health and Safety Code. Reference: Sections 39000, 39001, 39002, 39003, 39500, 39315, 39516, 41511, 43000, 43016, and 43101, Health and Safety Code, and Western Oil and Gas Ass'n. V. Orange County Air Pollution Control District, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).